

GMFC-0032
(GP-300032)

**CARBON MONOXIDE ADSORPTION FOR CARBON
MONOXIDE CLEAN-UP IN A FUEL CELL SYSTEM**

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ABSTRACT OF THE DISCLOSURE

An apparatus removes carbon monoxide (CO) from a hydrogen-rich gas stream in a hydrogen fuel cell system. CO fouls costly catalytic particles in the membrane electrode assemblies of proton exchange membrane (PEM) fuel cells. A vessel houses a carbon monoxide adsorbent. The vessel may be a rotating pressure swing adsorber. A water gas shift reactor is upstream of the rotating pressure swing adsorber. The water gas shift reactor may include a second adsorbent adapted to adsorb carbon monoxide at low temperatures and to desorb carbon monoxide at high temperatures. The apparatus advantageously eliminates the use of a preferential oxidation (PROX) reactor, by providing an apparatus which incorporates CO adsorption in the place of the PROX reactor. This cleans up carbon monoxide without hydrogen consumption and the concomitant, undesirable excess low grade heat generation. The present invention reduces start-up duration, and improves overall fuel processor efficiency during normal operation.

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